KNOWLEDGE
AN ILLUSTRATED
MAGAZINE OF SCIENCE
PLAINLY WORDED—EXACTLY DESCRIBED

LONDON: FRIDAY, APRIL 13, 1883.

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Science and Art Gossip.

I like America, and the theory of the American Government is far and away better, to my mind, than that of our own. But it must be admitted that in practice there is nearly as much to sicken the soul in America as nearer home. How an American not absolutely a stone must burn with mingled wrath and shame when he thinks of the way in which bought Congressmen and Senators insult America under pretence of protecting American manufacture? What a noble bird the American Eagle seems when crafty Customs collectors are feeling its plumage for smuggled goods! How long, by the way, before thieves and rogues turn America into a nation of smugglers?

But just now even the long-suffering American is a little moved at one of the wrongs which he pays his Members of Congress and Senators to inflict upon the nation. American art is now insulted by proffered protection. An idiotic Philadelphian, some boorish booby, by whom bought is not clear (for American artists fear no European competition), managed to persuade the Tariff Commissioners (who must be grossly ignorant) that native artists need protection, and so caused a duty of 30 per cent. to be imposed on pictures by foreign artists. I can conceive the gnashing of teeth with which my artistic friends of the Century Club received the news that they had been thus insulted. Manufacturers seem not to have been greatly troubled when protective duties taught them that their country considers they are so utterly inferior to their European fellows that, to help them along, the whole nation must suffer loss. But that the painters and sculptors of America should be told they are 30 per cent. worse than those of Europe, is an insult such as only the American Congress could inflict on American art.

Will it be believed that the mischievous humbug Wiggins, whose only escape from being recognised as an unmitigated knave lies in the widespread belief that he is an utter dolt, actually claimed credit on March 12th, at his home in Ottawa, for having truly foretold the weather of March 11th. He had threatened the most terrible disasters from storms by sea and by land, had frightened many foolish folk nearly to death (one at Buffalo actually died from terror), had caused serious loss of property, and—his prediction had turned out to be what weeks before we had called it in these pages—mere rubbish. March 11th this year was rather less disturbed than usual. High tides occurred as indicated four years before by astronomers, but these did no more harm than such tides usually do. Not a ship at sea was to survive the great storm, but the wreckage for March 11th was below rather than above the average.

Yet this mischievous idiot calmly welcomed people who called on the 12th (presumably to chaff him), with the air of an acknowledged prophet. Probably a little further south the call would have been made with ideas not wholly remote from the plumy covering of birds, and a resinous substance of a dark-brown colour. And though such ways of correcting charlatans are to be reprehended, few would have felt very much pity for Wiggins, windy humbug that he is.

After the manner of prophets, however, we point proudly to our own prediction—though it required no conjuror to make it—that whatever weather there might be on March 11th, the prophet would say that was just what he meant to be expected.

The Simoom and Dust Storms.—In a paper recently read before the Meteorological Society, Dr. H. Cook, F.R.G.S., described the dust storms which take place in Beloochistan, North-West India, and stated that he considers them to be due to an excess of atmospheric electricity. With regard to the simoom, which occurs usually during the hot months of June and July, it is sudden in its attack, and is sometimes preceded by a cold current of air. It takes place at night as well as by day, its course being straight and defined, and it burns up or destroys the vitality of animals and vegetable existence. It is attended by a well-marked sulphurous odour, and is described as being like the blast of a furnace; and the current of air in which it passes is evidently greatly heated. Dr. Cook believes it to be a very concentrated form of ozone, generated in the atmosphere by some intensely-marked electrical condition.

M. de Lesseps arrived on the 27th ult. at Tozeur, on the proposed Sahara Sea scheme. Soundings 73 mètres deep have shown the existence of nothing but sand. The African inland sea might easily be made, with the aid of 100 excavators, representing the work of 100,000 men. M. de Lesseps has met with the best reception from the Arab soldiery and population. On the 3rd inst. he arrived at Biskra, having completed a survey of the country between Gabes and the Marsh Lakes. He declared that the soil will allow of the excavations necessary to connect the lakes with the Mediterranean, that the works will present no extraordinary difficulty, and that the concessions asked for with regard to the forest and adjoining lands will make the scheme remunerative and wholly independent of State aid, subvention, or guarantee. M. de Lesseps telegraphed a report favourable to the projected inland sea to the French Government on the 3rd inst.

The library and dining-room of the House of Commons is now lighted by the Edison Electric Light Company, with 265 incandescent lamps; three more being used in

the engine-room. A cable of 150 ft. in length runs from the engine-room to the library and dining-room, where branch wires go to the clusters of lamps. Each chandelier is kept under perfect control by means of an automatic regulator. The contract for the lighting extends to the end of the present session of Parliament.

At the forthcoming electrical exhibition in Vienna there is to be a pavilion specially constructed according to the wishes of the Emperor of Austria, and designed to show the effect of the electric light on cloths and broideries. Different systems will be exhibited. The Academy of Painting and Sculpture at Berlin has been lighted by 200 Edison lamps, and the dynamo is driven by a Ruston-Proctor engine of sixteen horse-power. At Buda-Pesth, the capital of Hungary, the National Theatre is to be lighted by 1,000 Swan lamps. The theatre of Brunn, in Moravia, has been lighted for several months by Edison lamps. The municipality of Moscow has voted a sum of 80,000 roubles for the illuminations on the occasion of the Czar's coronation, in May. The Citadel of the Kremlin will be lighted by forty 400-candle-power lamps.

The Edison System in Paris.—*L'Electricité* says:—"On the 20th March M. Louis Rau, manager of the Société Edison, gave a brilliant reception in his *salons*. Edison lamps replaced candles and gas-burners throughout. On the commencement of the *cotillon*, towards 2 a.m., each of the lady dancers was presented with a bouquet, in the middle of which shone an incandescent lamp. After a mazy valse, the bouquets were deposited on a daïs, where they formed a grand constellation of flowers and light. The lamps were fed by means of batteries devised by M. Trouvé."

Purifying Air for Breathing. — An apparatus—Stanley's patent—is now being brought out for the purposes of cooling, purifying, and disinfecting the air of saloons, cabins, hospitals, &c., by Mr. W. L. Thompson, of York-buildings, Adelphi. The system consists in pumping cold water through pipes which are fixed in the ceilings, running the length and across the saloon or ward in an hospital. In these pipes are fixed rods, outside which it is intended that a thin film of water shall trickle down, which will be regulated by a cap fitted to the upper end of the rod. The water, in thus running down the rod will, it is claimed, absorb all the particles of dust, &c., that may be floating in the air, also cool and purify the vitiated atmosphere; and any of the known purifying chemical agents can be mixed with the water for the purpose of disinfecting, such as Condy's fluid. The water, after running down the rods, will be carried away by an arrangement of pipes under the flooring. To prevent any contact with the water, a guard of brass wire gauze can be fixed.

Respirators for Mines.—Mr. Dickinson, H.M. Chief Inspector of Mines, made an important communication to the members of the Manchester Geological Society at their meeting on Tuesday. His attention, he said, had been requested to the subject of a respirator and a lamp for penetrating noxious gases in mines; and, after detailing the various efforts which had been made in this direction, he gave a description of the Fleuss exploring respirator, to which, he said, the attention of the Secretary of State had been drawn; and the Government were anxious that the inspectors of mines should make it well known, and that the various colliery districts should participate in its benefits. It was suggested that stations should be organised in mining districts, where the apparatus should be stored in sufficient numbers, and maintained in readiness for immediate use, and where the instruction of the men from the surrounding coal-mines in its use should be systematically carried out, in order that a rescuing party could thus be speedily on the spot after the occurrence of an accident. Satisfactory results had been secured with the apparatus, but with it organisation was required; oxygen gas had to be provided, and men instructed in the use of the apparatus. The diving-dress in connection with the apparatus was acknowledged, and practised now and then in pumping pits; and it was put on when upwards of 200 men were shut up in the Hartley Colliery, and had been proposed for other occasions without, however, much useful effect. The question of safety-lamps was also before the meeting, and it was urged by Mr. Purdy, of Nottingham, that, as it was well known many explosions had been caused by the faulty construction of lamps, every lamp-maker ought to be made reponsible for each lamp he sent out.

The Rational Dress Association will hold their Exhibition of Rational Dress in the New Princes' Hall, Piccadilly, W. (shortly to be opened by T.R.H. the Prince and Princess of Wales, on or about May 15. Prizes from £5 to £50, with Silver and Bronze Medals, will be given to successful competitors who invent garments for either sex which comply with the following conditions, viz.:—1. Freedom of movement; 2. Absence of pressure over any part of the body; 3. Not more weight than is necessary for warmth, and both weight and warmth evenly distributed; 4. Grace and beauty combined with comfort and convenience; 5. Not departing too conspicuously from the ordinary dress of the time.

The loss by worn silver, withdrawn from circulation because of deficiency in weight caused by wear, last year amounted to not less than £35,000.

There are 254 miles of tramways built abroad with English capital, for which £3,584,700 has been required.

The constructed and authorised tramway mileage of the United Kingdom is nearly 400 miles, the authorised capital being about £11,000,000.

M. Silvestri has recorded—"Bull. de la Soc. Chim.," Dec. 20, 1882—that some years ago he found in a basaltic rock, cavities filled with a liquid which partly solidified on cooling. This liquid consisted of a mixture of hydrocarbons containing 42·8 per cent. of paraffine. Its density was 0·9475 at 20°. On carefully studying this rock he came across other cavities, of about 1 centimètre in diameter, filled with a solid crystallised paraffine. This substance is yellowish-white, resembling wax. It melts at 56°, and boils at 300°. It is insoluble in water, almost insoluble in cold alcohol, very soluble in ether. It is almost identical with the solid paraffine contained in the liquid mentioned above. Its composition is represented by the following mean numbers:—Carbon, 84·003; hydrogen, 15·846; total, 99·849. The "Journal" of the Society of Chemical Industry remarks:—"With reference to Professor Silvestri's interesting observation of the occurrence of a paraffine in the lava from Etna, the fact may be recalled that twenty years ago Professor Roscoe extracted a waxy substance containing paraffine from the Alais meteorite."

XUM

LECTURES AND THE LONDON PAPERS.

By Richard A. Proctor.

IT is singular how differently the London papers and those of New York, Boston, Philadelphia, Cincinnati, Chicago, St. Louis, St. Francisco, Melbourne, Sydney, Adelaide, Hobart Town, Dunedin, Christchurch, Auckland, Wellington, and indeed every considerable place in America and Australia, treat lectures on scientific, artistic, or literary subjects. In America a course of lectures such as I have now nearly completed at St. James's Hall is a familiar matter enough. There would be no reason, on the score of mere novelty, why such a series of lectures should receive special attention. Yet, whether given by an American or by an Englishman, a series of lectures of the kind would be heralded by articles and notices in every paper, small and great; the opening lecture would be attended by representatives of the press prepared to report it *in extenso* for one paper, at nearly full length for another, here in full abstract, there in condensed abstract, but always well. If the first lecture were satisfactory, and were also (which is else) successful, the attentions of the press would be increased; and full success would be greatly helped by their support. In a few days not an intelligent person in the city, in the state, nay, in the length and breadth of the land, would fail to know whether the lectures were good, bad, or indifferent, well worth attending, or very much the reverse. In London it is different. Who ever saw lectures on science, art, or literature fully reported in any London paper? To a humourist like Artemus Ward or Mark Twain, a third of a column may, as a great concession, be accorded, once now and again. But this is very rarely done.

Certainly I am freed in my own case from any risk of attributing the success of my lectures at St. James's Hall to press influence. I remember when I gave my first course of lectures at Association Hall, New York, in 1873, I was disposed to consider that with such support as the press gave me, the lectures could not possibly have failed. The Secretary of the Young Men's Christian Association filled a quarto scrap-book more than an inch thick with press extracts relating to that course of lectures alone. I wondered whether, if I ever gave another similar course, I should have anything like similar success; and it was with some misgiving that I consented to give six lectures at Steinway Hall in 1875. But they were even better attended, and as fully reported and noticed. The experience was repeated at the Chickering Hall in 1879. Wherefore, I hold and maintain that the American people do not, as many assert, go once to hear and see a man out of curiosity, and then leave him for the next novelty, but give staunch and steady support,—on one sole condition, that a man shall give them his best. The one thing American audiences will not stand, is the attempt to palm off on them anything short of the very best a man can do. A first-rate actor or lecturer giving them second-rate work, will have "a worse time" than a fourth-rate one by reputation, who, by persevering exertion shall succeed in giving third-rate work. They detect any falling off through carelessness or laziness intuitively, and never mistake for it deficiencies arising from real want of power or capacity. I know this well. For, ten years ago there were certainly many marked faults in my lecturing, which I was then striving—but not as yet successfully—to correct. These must have been manifest to many; but because I *was* striving to correct them, these faults were forgiven, and I was encouraged to persevere.

In London the press gives practically no support at all to lectures on science, art, or literature. Such lectures are so seldom given that one would suppose they would have a certain claim from their novelty to notice from the leading papers. But they never are noticed; and, as a consequence, they very seldom are successful. I was assured, when I mentioned my purpose in reference to the series now drawing to a close, that such lectures never could succeed in London, for the press would never notice them. One half of this prophecy has certainly failed; but the other has been made good, as I knew it would be, having seen how all who have ever made a similar experiment have been "welcomed" in the metropolis of the world.

But is it altogether fitting that this should be so? Is it likely that the particular form of culture which lectures on science, art, and literature are intended to advance, can be advanced nearly as rapidly in this country as in America and in Australasia, so long as this Philistinism characterises our city press? (In the provinces the press is altogether more advanced.) With anything like proper support, the course of lectures now drawing to a close might have led the way to other experiments in the same direction. The London public might have heard Professors Tyndall and Huxley on their subjects, Doctors Carpenter and Richardson on theirs, besides a number of others well able to instruct and interest them outside the rooms of Philosophic and Literary Institutions. But under such a system of press repression as exists who is likely to try the experiment, unless (as I chanced to be) he is prepared to lose £300 or £400 over the venture? It is true he can advertise freely; and as it would be mere waste to send course tickets to the press, he may gain something there which in America (where it is not unusual for half-a-dozen tickets to be given to the representatives of a single paper) he would lose. He may also bill the town if he pleases; and by choosing such a hall as St. James's, he may make sure of reaching with posters and so forth the best of the population. But the risk of loss is great all the same; and successful as I have been—by good fortune—in my own venture, I would not care to repeat it in London, nor would I advise others to do so, while our city press limits its reports and notices to theatrical and musical entertainments.

It may seem singular that in the midst of a great success—a success which every one seems to consider marvellous (which it may be for London, though in every great city in America or Australasia where I have lectured, a greater success has been much more easily and much more *safely* achieved)—I should write in a tone not altogether sanguine. But I know from experience how much in these cases depends on press support, in the long run. I have succeeded by good fortune in this particular case without any press support worth noticing. But I would not care to try the experiment again in London, and still less to try what I had proposed, and before long hoped to do—viz., to take the risk of inviting other lecturers to address the London public in the same hall and under similar conditions. With a decent amount of press support, the experiment would be safe enough; as matters actually stand, no one should attempt it who is not ready to risk a few hundreds for the spread of scientific knowledge.

But press support is the only thing that London needs in the matter. So far as the material for audiences is concerned, it is plentiful, and of excellent quality. With the exception of an occasional tendency to talk (always noticed where lectures are a new experience) London audiences are as good as any I have ever addressed.

XUM

THE CHEMISTRY OF COOKERY.

VII.

By W. Mattieu Williams.

A SHEEP or an ox, a fowl or a rabbit, is made up, like ourselves, of organic structures and blood, the organs continually wasting as they work, and being renewed by the blood; or, otherwise described, the component molecules of these organs are continually dying of old age as their work is done, and replaced by new-born successors generated by the blood.

These molecules are, for the most part, cellular, each cell living a little life of its own, generated with a definite individuality, doing its own life-work, then shrivelling in decay, dying in the midst of vital surroundings, suffering cremation, and thereby contributing to the animal heat necessary for the life of its successors, and even giving up a portion of its substance to supply them with absorption-food. The cell walls are mainly composed of gelatine, or the substance which produces gelatine, as already explained, while the contents of the cell are albuminous matter or fat, or the special constituents of the particular organ it composes. A description of all these constituents would carry me too far into details. I must, therefore, only refer to those which constitute the bulk of animal food, and which are altered in the process of cooking.

In the lean of meat, *i.e.*, the muscles of the animal, we have the albuminous juices already described, the gelatinous membranes, sheaths, and walls of the muscular fibre, and the fibre itself. This is composed of *muscular fibrin*, or *syntonin*, as Lehmann has named it. Living blood consists of a complex liquid, in which are suspended a multitude of minute cells, some red, others colourless. When the blood is removed and dies, it clots or partially solidifies, and is found to contain a network of extremely fine fibre, to which the name of *fibrin* is applied. A similar change takes place in the substance of the muscle after death. It stiffens, and this stiffening, or *rigor mortis*, is effected by the formation of a clot analogous to the coagulation of the blood, and the substance of this clot (*myosin*) is so nearly like the fibrin of the blood and the material of the muscular fibre (*syntonin*) that for our purpose they may be all described as varieties of fibrin.

The properties of fibrin, so far as cookery is concerned, place it between albumen and gelatine; it is coagulable like albumen, and soluble like gelatine, but in a minor degree. Like gelatine, it is tasteless and non-nutritious *alone*. This has been proved by feeding animals on lean meat, which has been cut up and subjected to the action of cold water, which dissolves out the albumen and other juices of the flesh, and leaves only the muscular fibre and its envelopes. The same is the case with the spontaneously coagulated fibrin of the blood; it is, when washed, a yellowish opaque fibrous mass, without smell or taste, insoluble in cold water, alcohol, or ether, but imperfectly soluble if digested for a considerable time in hot water.

The following is the chemical composition of these three constituents of lean meat, according to Muller :—

	Albumen.	Gelatine.	Fibrin.
Carbon	53·5	50·40	52·7
Hydrogen	7·0	6·64	6·9
Nitrogen	15·5	18·34	15·4
Oxygen	22·0	24·62	23·5
Sulphur.....	1·6	...	1·2
Phosphorus ...	0·4	...	0·3
	100·0	100·00	100·0

There are two other constituents of lean meat which are very different from either of these—viz., *Kreatine* and *Kreatinine*, otherwise spelled creatine and creatinine. These exist in the juice of the flesh, and are freely soluble in cold or hot water, from which solution they may be crystallised by evaporating the solvent, just as we may crystallise common salt, alum, &c. They thus have a resemblance to mineral substances, and still more so to some of the active constituents of plants, such as the alkaloids, *theine*, and *caffeine*, upon which depend the stimulating or "refreshing" properties of tea and coffee.

Their chemical composition and general relations have suggested the theory that they are the dead matter of muscle, the first and second products of the combustion which accompanies muscular work, urea being the final product. According to this, their relation to the muscle is exactly the opposite of that of the albuminous juice, this being probably the material from which the muscle is built up or renewed. The following is their composition, according to Liebig's analyses :—

	Kreatine.	Kreatinine.
Carbon	36·64	42·48
Hydrogen.....	6·87	6·19
Nitrogen	32·06	37·17
Oxygen	24·43	14·16
	100·00	100·00

The juices of lean flesh also contain a little lactic acid—the acid of milk—but this does not appear to be an absolutely essential constituent. Besides these there are mineral salts of considerable nutritive importance, though small in quantity. These, with the kreatine and kreatinine, are the chief constituents of beef-tea properly so called, and will be further treated when I come to that preparation. At present it is sufficient to keep in view the fact that these juices are essential to complete the nutritive value of animal food.

I may now venture to state my own view of a somewhat obscure subject—viz., the difference between the roasting or grilling and the stewing of meat. It appears to me that, with the exception of the superficial "browning," it consists simply in the difference between the cooking media; that a grilled steak or chop, or a roasted joint is meat that has been stewed in its own juices instead of stewed in water; that in both cases the changes taking place in the solid parts of the meat are the same in kind, provided always that the roasting or grilling is properly performed. The albumen is coagulated in all cases, and the gelatinous and fibrous tissues are softened by being heated in a liquid solvent. I shall presently apply this definition in distinguishing between good and bad cookery.

In the roasted or grilled meat the juices are retained in the meat (with the exception of that which escapes as gravy on the dish), while in stewing the juices go more or less completely into the water, and the loosening of the fibres and solution of the gelatine and fibrin may be carried further, inasmuch as a larger quantity of solvent is used.

Roasting and grilling may be regarded as our national methods of flesh cookery, and stewing in water that of our continental neighbours. The difference between the flavour of English roast beef and French *bouilli* or Italian *manzo* is due to the retention or the removal of the saline and highly-flavoured soluble materials. (Concentrated kreatine and kreatinine are pungently sapid.) The Frenchman takes them out of his *bouilli*, or boiled meat, and transfers them to his *bouillon*, or soup, which with him is an essential element of a meal. If he ate his meat without soup he would be like the dogs fed on gelatine by the bone soup commissioners. To the Englishman, with his roast or grilled meat, soup is merely a luxury, not a necessary element of complete dietary.

What we call boiled meat, as a boiled leg of mutton or round of beef, is an intermediate preparation. The heat is here communicated by water, and the juices partially retained.

Note.—A correspondent tells me that he has tried the method of cooking eggs which I recommended, and he states that his eggs "were not cooked at all." From what I can learn by his letter, he omitted to attend to the quantity of water I named, viz., *about a pint*.

As this is of essential importance, I should perhaps have stated it with some emphasis. More than a pint should be used rather than less, as upon the quantity of water depends the retention of the heat. If the quantity of water is smaller, it should be kept boiling about half-a-minute before setting aside.

PLEASANT HOURS WITH THE MICROSCOPE.

By Henry J. Slack, F.G.S., F.R.M.S.

EVERYONE who has a greenhouse, and many who have only a few flowers in a window, are sure at this time of the year to be supplied with objects of great interest to the naturalist, though a sad plague to the gardener. Plant-lice, thrips, and so-called red spiders are sure to swarm as the warm weather comes, unless active warfare has been, and continues to be, waged against them. It is with the plant-lice or aphides that we are now concerned. A vast number of plants—from humble weeds to great forest trees—are infested with different kinds of sucking insects belonging to this group, and near them are the tribes of mealy-bugs, scale-bugs, mussel-bugs, &c., that injure orchards and wall-trained fruit-trees.

A few days since, a large trumpet-lily (*Richardia Æthiopica*) showed a few aphides in little groups on its stalks and on some leaves. Day by day the groups increased at a rapid rate, and large colonies were soon formed. The process was allowed to go on for a little while for the sake of watching it. The first things noticeable on examining a group were that they differed greatly in size, and that the biggest were marked with black on their backs, the rest of their bodies being green. The smaller ones were of paler, yellowish green.

It is always best to begin with examining objects whole, and studying what is obvious before proceeding to details. Such small soft insects as plant-lice should be lifted carefully with a needle stuck in a wooden handle, or with a long, stout bristle from a broom. Those intended for immediate examination may be collected on a plate of glass, or on a card, and others, if the supply is not close at hand, should be carefully placed in a little bottle, such as Homœopathic chemists use, or in a goose-quill stopped with a little plug of cotton wool.

A small group of big and little ones may be seen altogether with a power of from 30 to 50. Then two of the largest should be selected, and placed on a glass slide that has been touched with a very little gum-water. One should be laid on her back, and the other on the under side. The specimens caught on the trumpet-lily correspond in size and markings with *Siphonophora circumflexa* of Buckton's great work on British Aphides. They are wingless, viviparous females, and, as we shall see, quite ready to produce a numerous family. Mr. Buckton gives the size of full-grown ones as 0·070 × 0·030 inches. Their shape in an oblong oval, gradually swelling out in a graceful curve from the head to the lower third of the abdomen, and then getting narrower and ending bluntly. The back of the adult is ornamented with a long horse-shoe row of irregular black spots, the rounded curve being near the end of the abdomen, and the two open parts beginning just below the head. The contrast of black and green has a very pretty effect, which the smaller and younger specimens do not show. It is a coming-of-age decoration. Six legs are noticeable, ending in small, hooked feet. The most striking thing in the one lying on its back is the proboscis or long snout, which folds down over the thorax, and reaches to near the third pair of legs in the adult, and lower still in the undeveloped young. This kind of mouth belongs to some other groups besides the Aphides, and differs widely from the biting mouths of beetles, the more complex sucking ones of butterflies and moths, and from the licking ones of bees. It consists of a sort of tube in three joints, the longest near the head, and two smaller ones at the tip. A grooved line is seen with a low power, and most likely in one specimen or another three very slender, flexible, and sharp-pointed lancets will either be projected from the tip or elevated upwards out of the groove. The stout rostum or proboscis is regarded as an extension of the *labrum*, or under-lip, of ordinary insects, and the three fine piercing tools as representing the mandibles and maxillæ of a typical insect. Mr. Buckton says the second joint of the proboscis appears to be perforated, not channelled, like the others, but this is difficult to make out. From the small size of the whole apparatus, and the extreme fineness of the setæ, or piercing bristles, it is not at all easy to take them out with a needle, but they often come out when the creature is immersed in a fluid. Before making any dissections, the easily-visible organs should be well studied in the living animal. The plan mentioned, of keeping a couple quiet with a little gum, does for a beginning, but a better one will be described in the next paper. Besides the proboscis, the eyes of the creature will appear striking. They are of a fine red tint. Each large compound eye has round lenses and little knob of eyes, also compound, stuck on to it at one corner. The lenses of these supplementary eyes are rather larger than the others, and no one knows what use they are. The head is short, and the first segment of the thorax looks at first sight scarcely separated from it. The antennæ are very long. They spring from a stout projection, and are six-jointed (seven is the full number). The first two joints short, followed by longer ones. The last one is long, looking, when highly magnified, like four or five dozen miniature garden-pots, one inside the other, the end ones being a little longer, and the whole finishing with a fine bristle. Besides tapering, the last joint makes a sudden diminution of diameter at about one-third from its commencement. The segments become abruptly smaller, the last of the larger ones projecting on one side, the first of the smaller ones being out of centre and fixed to the other side. This gives a notched appearance. Looking to the tail-end of the creature, two remarkable organs stick out from the thickest part of the abdomen. They are shaped like the funnels of a steamboat, cylindrical tubes turning over at the top, and contain some oily-looking globules. They are the cornicles, sipuncles, or nectaries, and secrete a sweet fluid. The aphides which certain ants keep as we do cows, give out this fluid when their proprietors stroke them in a sort of milking process. The tail of the species before us is seen, when protruded, to be like a short stout club covered with tubercles.

The inside of the aphid is crowded with oily globules, and most likely one, or perhaps several, unborn infants can be discerned. Their red eye-spots show their whereabouts, and if a few of the adults are kept in a warm room in a glass cell, the birth process is sure to be seen by frequent watching. The little things make their entrance into life

tail] foremost, with their limbs closely pressed to their bodies, and are, at first, cylindrical in shape.

By cementing with shellac glue a glass ring to an ordinary slide, a convenient cell is made to hold the creatures, and a glass cover will adhere if the edge of the ring is touched with a little wax—or, what is better, a mixture of tallow and wax.

Cells are also conveniently made by cutting a small hole in a thin disc of cork and gumming on to a slide. A phial cork about five-eighths of an inch in diameter cut across, so as to make a disc one-sixteenth of an inch thick, and with an oblong hole in the middle, makes an excellent cell; and, as gum is not dissolved by paraffin oil, it is just the thing for an experiment which will be described in the next article.

Most of the description now given is applicable to all species of plant-louse, but some of the details differ in each one.

THE NEW SKIRT.

By a Lady.

I HAVE received, through the Editor, many letters asking about the new skirt: too many for me to answer directly. I now answer them, so far as I can. I would have done so sooner, but I have not the pen of a ready writer.

Most of the letters ask where to obtain the new skirt, and others ask how it is to be made. I do not know where it can be obtained. But, in reality, there is very little difficulty about making it, or getting it made. The shape is very similar to that of gentlemen's trousers, only rather fuller. It should reach to the ankle. I put pleating on mine, about eleven inches deep, fulness about two breadths of satin. The skirt thus made not only does not interfere with walking, but is much easier to walk in than any single skirt imaginable. There is nothing to show that the skirt is divided, unless, perhaps, in getting into a carriage, when a bystander may recognise that the new skirt is worn,—from the simple circumstance that the ankles are not seen, as when a single skirt is worn.

Many have asked me how the dress can possibly be kept from wrinkling after stays have been left off. I have three whalebones put in each dress, in front. These do not support me in the least, or, in other words, have none of the mischievous effect of stays; they simply keep the dress smooth.

Patterns can, I believe, be obtained from the Rational Dress Society; but ladies can easily make their own, or get them made by their dressmaker. The Rational Dress Exhibition, to be held about the 15th of May, in Princes' Hall, Piccadilly, will doubtless afford a number of useful suggestions.

I take this opportunity of correcting a figure in my former remarks—instead of 39 inches round the chest, 35 inches should have been named. I suppose my "5" was mistaken for a "9."

[There has been a complete revolution of ideas among my "womankind" (as Mr. Monkbarns used to call the ladies of his household) since the discussion on waist-compression went on. Without a word of suggestion on my part (in fact, I am not in the habit of giving advice on such matters unasked) one after another has first left off stays, then presently tried the divided skirt, which seems essential to comfort, because without it the dress drags and wrinkles; and now, after three months, they one and all agree that they "would not go back to stays and petticoats, *for anything*." For tricycling the dress is perfect, for lawn-tennis delightful, for singing splendid, and for dancing simply exquisite. I venture to suggest that the substitution of a softly-clad, lissome, and yielding waist for that hard enclosure of steel and whalebone which the arms of our youth have heretofore encircled in the mazy dance, will make mazurka, waltz, and polka a little too pleasant to be altogether approved of by the strait-laced: but then even Mrs. Grundy will cease to be strait-laced if rational dress becomes the fashion.—R. P.]

THE CENTRAL TELEGRAPH OFFICE.

By W. Slingo.

LONDON, the centre of the commercial world, the heart of one of Europe's great nations, has within it many edifices, monumental or useful, which awaken feelings of pride within the breasts of its citizens, and call for the greatest respect from its visitors. Its position and the millions of its residents call into existence several industries peculiar to itself, and foster the development of other callings in a way that no one would have foreseen or even deemed possible. It is often said, and doubtless very truly, that the genuine Londoner knows less of his city's features than a sojourner could learn in the space of a few days. How many are there who, when walking along St. Martin's-le-Grand, give a thought to what is going on almost over their heads, or indeed have the smallest conception of the work that is being performed? As to the visitor who has wandered so far from the general track as to venture within the room which embraces the whole of the uppermost story of the huge building commonly known as the new General Post-Office, and which room is called the Central Telegraph Office; what is the effect upon him? Is it comparable to that produced by any other sight? The Royal Arsenal, the Mint, and such-like places, are all objects of great interest, but the result of the labour is visible, it is tangible—there is nothing supposititious about it. Even the sorting-room of the Post-Office, interesting and thrilling as it is at mail-time, has still an air of mechanical reality about it. Huge piles of letters and packets are sorted, bagged, and sealed, and then taken to the mail-cart for conveyance to the railway terminus, whence everyone knows they are carried bodily to their various destinations. There is little in all this compared to what one sees in the instrument-room "over the way." There one perceives hundreds of clerks seated at their instruments, all busy—doing what? A piece of paper—a telegraph message—is laid before one of them. You see him rapidly shake his hand over a "key" for a few seconds, then a few clicks are heard, and the piece of paper is hung on a spike, to be eventually taken away, and, after a time, converted into pulp. If you ask him what he has done, he will tell you that he has despatched the message, letter for letter, to Liverpool, Glasgow, Dublin, or wherever may be its destination, that he may not know the meaning of a single word contained in it, and that it is in all probability, by the time you have done speaking, in the messenger's pouch, and on the point of delivery. On turning to the next instrument, you hear a series of rapid clicks, or you see a string of dots and short strokes imprinted on a narrow strip of paper as it issues from the instrument, and the clerk is translating these "signals" or "marks" into common everyday language, at the same time committing the words to paper to be subsequently delivered as a telegraphic despatch. Here, then, is something which appeals almost exclusively to one's conception of the marvellous, the unseen, the immaterial. It may be, however, that we should be disposed to think less of it were it not that the operations above described are going on more or less simultaneously at each

of the 636 sets of apparatus distributed over the room, occupying desks extending, altogether, to 3,060 ft., and that during the course of a year (1881-2) as many as 14,293,383 telegrams passed through the office. Doubtless the old lady who, anxious that her son in a distant part of the country should be well shod, persisted in her application to have a pair of new boots sent to him by telegraph, and who was quite satisfied on receiving the next day a pair of old ones in return, wondered how such prodigies could be performed on a wire less than a quarter of an inch thick. Those who are acquainted with "Giles's Trip to London" have probably smiled when reading of his surprise on finding that the white paper on which he had had a message written had been dyed pink during the process of transmission. But Giles was not far behind a particular gentleman who a few weeks since expressed at the end of his telegram a hope that the addressee would "please excuse bad writing."

It is an open question which is the more deeply impressed—an electrician, or a man who professes total ignorance of the subject.

On entering the office the visitor is introduced to the "News" division, where there are thirty-one sets of Wheatstone automatic apparatus, some of them working all day, and the others after 6 p.m., to, on the aggregate, thirty-seven stations. It is here that a parliamentary speech, as supplied by the various agencies to provincial newspapers, may be despatched and delivered at the various destinations within a few minutes of the orator's resuming his seat. The result of such an event as the University Boat-Race is made known all over the Kingdom in less than three minutes after the judge has declared his verdict. During the year 1881-2, press messages amounting in all to 88,764,805 words, or sufficient to fill the whole of the *Daily Telegraph* for two and three-quarter years, were despatched in this division. This work is growing very rapidly, and it is nothing unusual on a night when there is an important Parliamentary debate to be reported for 500,000 words to be despatched, sufficient to fill 250 newspaper columns. To many, however, even greater interest centres in the "Test-Box," which is, in reality, a large board, or series of boards, fixed vertically, and studded with 7,800 double binding-screws or terminals, from which wires are led, on the one hand to the battery-room* and the street-work, and on the other hand to the instruments. It is an interesting fact that the wires under the floor, connecting the instruments with the test-box, would, if stretched out in one line, reach from London to Aberdeen. This wire, at about £13 per mile, represents in itself a small fortune.

Like the office itself, the test-box is claimed to be by far the largest in the world, and by its means the officers in charge are able to prove the condition of the 1,000 wires radiating from it in all directions, and to put various stations in communication with each other in such a way as would be absolutely impossible without it. It is, in fact, the key of the British telegraph system.

Standing with his back to the test-box, the visitor is face to face with the main portion of the room, a sea of heads before him, and a constant buzz pervading the atmosphere and ringing in his ears, with such bewildering intensity as to frequently render him oblivious to any distinct sound or conversation. He may from this standpoint behold at one time as many as 600 clerks seated at the various instruments, the greatest number on duty at one time being about 1,000, out of a total staff of 1,700. Between 2 and 7 a.m., there are, generally speaking, only 70 on duty. Amongst so large a staff, it is not to be wondered at that there are occasionally one or two prone to err, although, taken as a body, the proportion of blunderers is really infinitesimal. A remarkable error, due in part to indistinct writing, came under notice some little time ago. A newspaper correspondent wished to convey to his chief the intelligence that in a certain horse-race "the favourite made all the running, and won by a neck." Conceive the editor's amazement on reading that "the favourite made all the *morning*, and won by a *week*." Sometimes errors are caused by indifferent manipulation or negligent transcription. As an instance of this it is recorded that on a particular occasion a gentleman who was away from home was informed that he had that day been made the happy father of a "deal box." Of course, "dear boy" was intended. It is however, somewhat surprising that more errors are not made than is really the case, and the most uninitiated will admit this when he learns that to telegraph thirty words in a minute (an ordinary fair-working speed) the clerk has to press down the key of his instrument no less than 450 times, the duration of each signal, and the interval of time separating the signals, having always to be carefully and variously measured. Morse, when he first invented the code system, did not conceive it possible for the human hand to be capable of sufficient mechanical accuracy, and was greatly astonished to find his automatic apparatus easily and speedily outdone.

Terrestrial influences and faulty adjustment are occasionally responsible for errors causing at one time considerable amusement, and at others an equal amount of difficulty and annoyance. "G" and "p" are letters whose "codes" are very similar, a dot placed in front of the former (— — ·) converting it into the latter (· — — ·). A nobleman in town once telegraphed to his servant to meet him at the railway station with a "gig." Imagine his surprise on finding the man waiting his arrival and holding by a rope a fine young "*pig*." Fine, however, as he was in his way, it would hardly have been becoming for my lord to approach his manorial demesne straddling the youthful porker.

One of the most attractive features of the office is the "pneumatic" system, by which messages are placed in carriers, and forced through leaden tubes, pressure being exerted on outgoing carriers, and a vacuum created in front of incoming carriers. There are about fifty tubes in all, including fourteen which connect various parts of the office one with the other, obviating thereby the inconvenience that would result from constant streams of messengers running about the office in all directions. The speed at which the carriers travel varies slightly with the length of the tube, averaging about a mile in two minutes. The system is being rapidly developed for local traffic, and works very satisfactorily, but is not, however, economically practical for a greater distance than about two miles. The longest tube is to the House of Commons, a distance of about three miles, which is accomplished in two stages.

It is officially stated that the Department will soon institute a sixpenny tariff; but it is only natural that those responsible for the working of the service should evince no very strong desire to leap in the dark. A public company, responsible only to its shareholders, may reduce its tariff for an experiment, and subsequently restore it to its previous minimum (a proceeding frequently resorted to by the Transatlantic Cable Companies to stifle a new competitor); but a Government undertaking cannot be carried on in such a manner—the invariable policy being that a tariff once established is never to be increased. There is, nevertheless, very good cause for the agitation in favour of a

* The battery-room is in the basement of the building, and contains something like 20,000 cells, ranged in order on about three miles of shelving.

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reduction; and it is remarkable that, although the Postmaster-General, and other members who have in previous years held his appointment, voted against Dr. Cameron's motion, they all spoke in terms which must have been highly gratifying to those anxious for the reduction. It is possible for the wires to carry much more traffic than is at present demanded of them. Of the 653* circuits, only 190 are duplex, 54 Wheatstone automatic, and 12 quadruplex. The remainder comprise 148 single needle, 1 Bell, 4 Wheatstone A. B. C., and 244 single-working Morse printer and sounder circuits. The latter group are all capable of being converted into duplex or Wheatstone circuits, and not a few into quadruplex circuits. The great difficulty, therefore, so far as the central office, and offices in connection with it are concerned, is not the want of wires, but of accommodation for apparatus, demanding larger space than is at present available, and, having secured that, the creation of an army of trained telegraph clerks to work the circuits. The latter requisite is no small item; and those who once boasted they could take a boy from the plough-tail and transform him into a telegraphist within three months, would have cause to be grateful if they could accomplish such a transformation upon youths of average intelligence in four times that period.

It is noteworthy that several experiments have been made to test the adaptability of the electric light. The office is at present illuminated by gas consumed at 476 burners, the heat and the deleterious products resulting from so large a consumption being, as may be imagined, very troublesome. It is gratifying, therefore, to learn that the old illuminant is likely to be replaced by Edison incandescent electric lamps, 1,500 of which, as we noticed recently, are (it is said) to be fixed in the various parts of the building.

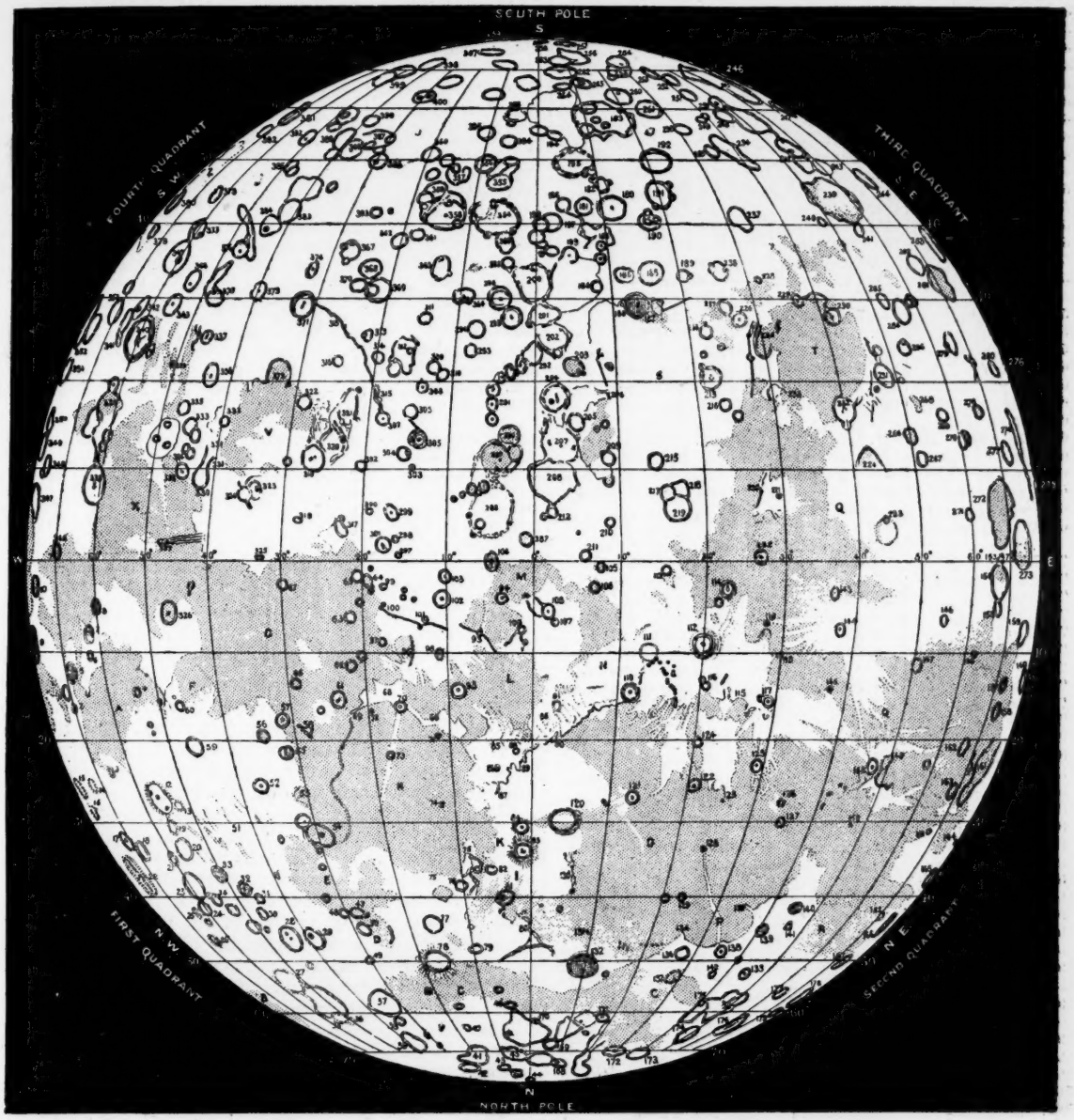
THE MOON IN A THREE-INCH TELESCOPE.

By a Fellow of the Royal Astronomical Society.

WE have now taken the student through the whole twenty-four hours of right ascension of our visible stellar vault, and have incidentally given sketches and descriptions of such planets as happened to be situated in those parts of the sky which we were engaged in describing at the time. So far, however, we have said nothing of the moon, and we therefore propose to treat of her in somewhat more detail, as, probably, one of the first objects to which the incipient possessor of a telescope will be likely to direct his instrument and attention. But we are not going to write here a complete treatise on selenography. Those of our readers whom we may succeed in interesting sufficiently in this subject will, doubtless, proceed to the section devoted to it in Webb's admirable work, "Celestial Objects for Common Telescopes," and to that even more elaborate one, "The Moon," by Mr. E. Neison, which may be fairly regarded as a kind of lunar encyclopædia. What we propose to do in these papers is to point out to the possessor of a 3-in. telescope exactly what it may be expected to show him in the shape of lunar scenery, and of the general physical conformation of our satellite. To this end we here present a map of the moon, founded on the excellent one by Mr. Webb, and which also appears in the volume on "The Moon," by the Editor of this journal. We have purposely retained the lettering and numbering adopted by Mr. Webb to facilitate reference, and propose to describe and draw a selection of the objects thus indicated, with the end of familiarising the student with the principal features of the surface of our satellite. Some of the chief of these we shall draw at the telescope, in order that the young observer may know precisely what to look for; and we shall in all cases give the exact age of the moon and the power employed, in order that our sketches may be directly comparable with the moon herself. The map almost explains itself. It gives an inverted image of the moon as it would appear in a telescope with an ordinary Huyghenian eye-piece of low power. The curved lines represent the lines of lunar longitude, the moon being supposed to be in what is called her condition of "Mean Libration." The meaning of this phrase (which is, however, not very material for our present purpose) will be found thoroughly explained in the work on "The Moon," by the Editor of Knowledge, to which we have referred above. One immediate use to which we may put these lines is this. The curve separating the illuminated part of the moon's disc from the dark part (technically called the "terminator") creeps over her face at the rate of 12° 1′ 26·7″ per diem. Hence, when she is one day old, the central part of this arc will be in lunar longitude 79° 49′ 33·3″ east of her centre; at two days old, at longitude 67° 37′ 6·6″ east; and so on until she is 7·38 days old, when she will be "dichotomized," or exactly half light and half dark. So far the bright crescent is concave towards the east. Afterwards the moon has entered her "first quarter," the "terminator" becomes convex towards the east, and continues to increase in convexity until full moon, when it merges in the moon's general circular outline. Suppose, now, that the student wishes to know what formations are near to the boundary of light and darkness when the moon is 5 days old. $5 \times 12° 11' 26·7'' = 60° 57' 13·5''$, the longitude of the terminator from the west limb. Taking this from 90°, we find 29° 2′ 46·5″ as its longitude from the moon's centre; and now, looking at the map, we see that when the craters and ring plains 374, 371, 372, 323, 57, 48, 37, &c., will all be illuminated (albeit, very obliquely), the sun will not yet have risen on 367, 321, 320, 319, 318, 47 and 50, and only partially on 54. In like manner, the position of the terminator at any other age of the moon may be determined.

In fact, our chief object in introducing these lines of longitude at all is to supply the beginner with the means of ascertaining, with sufficient accuracy, when any given formation is most favourably placed for observation, and, incidentally of identifying it. When once he is familiar with the leading features of the lunar surface, he will easily be able to determine for himself the times at which they can be most advantageously examined. If we reflect for a little, it will be seen that this must evidently be when the object under examination is most obliquely illuminated—in other words, when it is tolerably near to the boundary line between light and darkness. Suppose that we had to determine the shape of a white basin at a distance of a couple of miles, with a pocket telescope, at night, and had our choice as to the method of illuminating it. Obviously we should not cast the light of a lantern directly into it — or we should perceive nothing but a circular white patch in the telescope. We should light it from the side; the shadows which it would in consequence cast revealing its contour distinctly. Now, at full moon the sun is (for our present purpose) shining vertically on to our satellite, which, consequently, presents nothing but a mottled, spotted, and shaded surface, the most conspicuous features being certain dark patches, erroneously named "seas," and a radiating series

* This total includes 17 circuits at the Stock Exchange Office, which is regarded as part of the central station, and through which 1,720,421 telegrams passed in the year 1881-2.



of streaks issuing from a crater (hereafter to be described), called Tycho, situated, in an inverting telescope, towards the top of the moon. People with keen vision can detect this system of streaks with the naked eye; when so seen, though, they, of course, seem to radiate from the southern part, or *bottom*, of the moon. With these preliminary remarks, we may proceed to furnish a key to the map given above. We merely gives the names of the various formations here, reserving any description of them individually until we come to treat of their aspect in the telescope. Beginning, then, with the chief dark markings or patches:—

A, Sea of Conflicts. B, Humboldt's Sea. C, Sea of Cold. D, Lake of Death. E, Lake of Dreams. F, the Marsh of a Dream. G, the Sea of Tranquility. H, the Sea of Serenity. I, the Marsh of Clouds. K, the Marsh of Corruption. L, Sea of Vapour. M, Middle Bay. N, Bay of Heat. O, Sea of Showers. P, Bay of Rainbows. Q, Ocean of Storms. R, Bay of Dew. S, Sea of Clouds. T, Sea of Moisture. V, Sea of Nectar. X, Sea of Fertility. Y, Smyth's Sea. Z, the South Sea.

Ring Planes, Craters, Mountain Ranges, &c.

1. Promontorium Agarum
2. Alhazen
3. Eimmart
4. Picard
5. Condorcet
6. Auzout
7. Firmicus
8. Apollonius
9. Napier
10. Schubert
11. Hansen
12. Cleomedes
13. Tralles
14. Oriani
15. Plutarch
16. Seneca
17. Hahn
18. Berosus
19. Burckhardt
20. Geminus
21. Bernouilli
22. Gauss
23. Messala
24. Schumacher
25. Struve
26. Mercury
27. Endymion
28. Atlas
29. Hercules
30. Oersted
31. Cepheus
32. Franklin
33. Berzelius
34. Hooke
35. Strabo
36. Thales
37. Gärtner
38. Democritus

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39. Arnold
40. Christn. Mayer
41. Meton
42. Euctemon
43. Scoresby
44. Gioja
45. Barrow
46. Archytas
47. Plana
48. Mason
49. Baily
50. Burg
51. Mount Taurus
52. Römer
53. Le Monnier
54. Posidonius
55. Littrow
56. Maraldi
57. Vitruvius
58. Mount Argæus
59. Macrobius
60. Proclus
61. Pliny
62. Ross
63. Arago
64. Ritter
65. Sabine
66. Jansen
67. Maskelyne
68. Mount Hæmus
69. Promontorium Acherusia
70. Menelaus
71. Sulpicius Gallus
72. Taquet
73. Bessel
74. Linné
75. Mount Cancasus
76. Calippus
77. Eudoxus
78. Aristotle
79. Egede
80. Alps
81. Cassini
82. Thæætetus
83. Aristillus
84. Autolycus
85. Apennines
86. Aratus
87. Mount Hadley
88. Conon
89. Mount Bradley
90. Mount Huyghens
91. Marco Polo
92. Mount Wolf
93. Hyginus
94. Triesnecker
95. Manilius
96. Julius Cæsar
97. Sosigenes
98. Boscovich
99. Dionysius
100. Ariadæus
101. Silberschlag
102. Agrippa
103. Godin
104. Rhæticus
105. Sömmering
106. Schröter
107. Bope
108. Pallas
109. Ukert
110. Eratosthenes
111. Stadius
112. Copernicus
113. Gambart
114. Reinhold
115. Carpathean Mts.
116. Gay Lussac
117. Tobias Mayer
118. Milichius
119. Hortensius
120. Archimedes
121. Timocharis
122. Lambert
123. La Hire
124. Pytheas
125. Euler
126. Diophantus
127. Delisle
128. Carlini
129. Helicon
130. Kirch
131. Pico
132. Plato
133. Harpalus
134. La Place
135. Heraclides
136. Maupertuis
137. Condamine
138. Bianchini
139. Sharp
140. Mairan
141. Louville
142. Bonguer
143. Encke
144. Kepler
145. Bessarion
146. Reiner
147. Marius
148. Aristarchus
149. Herodotus
150. Wollaston
151. Lichtenberg
152. Harding
153. Lohrmann
154. Hevelius
155. Cavalerius
156. Galileo
157. Cardan
158. Krafft
159. Olben
160. Vasco de Gama
161. Hercynian Mts.
162. Seleucus
163. Briggs
164. Ulugh Beigh
165. Lavoisier
166. Gerard
167. Repsold
168. Anaxagoras
169. Epigenes
170. Timæus
171. Fontenelle
172. Philolaus
173. Anaximenes
174. Anaximander
175. Horrebow
176. Pythagoras
177. Œnopides
178. Xenophanes
179. Cleostratus
180. Tycho
181. Pictet
182. Street
183. Basserides
184. Hell
185. Gauricus
186. Pitatus
187. Hesiod
188. Wurzelbauer
189. Cichus
190. Heinsius
191. Wilhelm I.
192. Longomontanus
193. Clavius
194. Deluc
195. Maginus
196. Saussure
197. Orontius
198. Nasir-ed-din
199. Lexell
200. Walter
201. Regiomontanus
202. Purbach
203. Thebit
204. Arzachel
205. Alpetragius
206. Promontorium Ænarium
207. Alphonsus
208. Ptolemy
209. Davy
210. Lalande
211. Mösting
212. Herschel
213. Bullialdus
214. Kies
215. Guericke
216. Lubiniezky
217. Parry
218. Bonpland
219. Fra Mauro
220. Riphæan Mts.
221. Euclid
222. Landsberg
223. Flamsteed
224. Letronne
225. Hippalus
226. Campanus
227. Mercator
228. Ramsden
229. Vitello
230. Doppelmeyer
231. Mersenne
232. Gassendi
233. Agatharchides
234. Schiller
235. Bayer
236. Rost
237. Hainzel
238. Capuanus
239. Schickard
240. Drebbel
241. Lehmann
242. Phocylides
243. Wargenlin
244. Inghirami
245. Bailly
246. Dörfel Mts.
247. Hausen
248. Segner
249. Weigel
250. Zuchius
251. Bettinus
252. Kircher
253. Wilson
254. Casatus
255. Klaproth
256. Newton
257. Cabeus
258. Malapert
259. Leibnitz Mts.
260. Blancanus
261. Scheiner
262. Moretus
263. Short
264. Cysatus
265. Gruembergor
266. Billy
267. Harpsteen
268. Zupus
269. Fontana
270. Sirsalis
271. Damoiseau
272. Grimaldi
273. Riccioli
274. Cordilleras
275. D'Alembert Mts.
276. Rook Mts.
277. Rocca
278. Crüger
279. Bergius
280. Eichstädt
281. Lagrange
282. Piazzi
283. Bouvard
284. Vieta
285. Fourier
286. Cavendish
287. Reaumur
288. Hipparchus
289. Albategnius
290. Parrot
291. Airy
292. La Caille
293. Playfair
294. Apianus
295. Werner
296. Aliacensis
297. Theon sen.
298. Theon jun.
299. Taylor
300. Alfraganus
301. Delambre
302. Kant
303. Dollond
304. Des Cartes
305. Abulfeda
306. Almamon
307. Tacitus
308. Geber
309. Azophi
310. Abenezra
311. Pontanus
312. Sacrobosco
313. Pons
314. Fermat
315. Altai Mts.
316. Polybius
317. Hypatia
318. Torricelli
319. Theophilus
320. Cyrillus
321. Catherine
322. Beaumont
323. Isidore
324. Capella
325. Censorinus
326. Taruntius
327. Messier
328. Goclenius
329. Biot
330. Guttemberg
331. Pyrenees
332. Bohnenberger
333. Colombo
334. Magelhaens
335. Cook
336. Santbech
337. Borda
338. Langrenus
339. Vendelinus
340. Petavius
341. Paltizsch
342. Hase
343. Snell
344. Stevinus
345. Furner
346. Maclaurin
347. Kästner
348. La Perouse
349. Ansgarius
350. Behaim
351. Hecatæus
352. Wilhelm Humboldt
353. Legendre
354. Stöfler
355. Licetus
356. Cuvier
357. Clairant
358. Maurolycus
359. Barocius
360. Bacon
361. Buch
362 Büsching
363 Gemma Frisius
364. Poisson
365. Nonius
366. Fernelius
367. Riccius
368. Rabbi Levi
369. Zagut
370. Lindenau
371. Piccolomini
372. Fracastorius
373. Neander
374. Stiborius
375. Reichenbach
376. Rheita
377. Fraunhofer
378. Vega
379. Marinus
380. Oken
381. Pontécoulant
382. Hanno
383. Fabricius
384. Metius
385. Steinheil
386. Pitiscus
387. Hommel
388. Vlacq
389. Rosenberger
390. Nearchus
391. Hagecius
392. Biela
393. Nicolai
394. Lilly
395. Jacobi
396. Zach
397. Schomberger
398. Boguslawski
399. Boussingault
400. Mutus

The beginner with the telescope who has read or heard of "mountains" in the moon, and who takes his first look at our satellite with a view of examining them, will certainly be puzzled by the spectacle presented to his gaze. If we suppose the moon to be five or six days old, and that he is regarding her southern horn (or upper one, as seen in the telescope), he will be struck by the fact that it seems to be completely honeycombed by circular or elliptical holes, surrounded by ridges, their walls breaking into each other, and the depressions themselves being confluent in all directions. A little thought and attention will reveal the fact that these are volcanic craters on the plains, surrounded by cliffs, with, in many cases, conical hills rising from their centres, which we are viewing from above, as though, in fact, we were looking down upon them from the car of a balloon suspended at a tremendous height above them. In the case of those close to the terminator, the sun is just rising, and their depressed plains or cup-shaped interiors are still plunged in the blackness of night; while the more elevated cliffs surrounding them have already caught the sun's rays, and stand prominently out of the darkness. The words "blackness of night," which we have just used are peculiarly appropriate in the case of the moon, inasmuch as, from her absence of atmosphere, light is not scattered, as it is upon the earth, and everything that is not in brilliant sunshine is in total darkness. The observant student may possibly demur to this statement when he notices that, close to the terminator, the light fades gradually; but he must bear in mind that the sun is rising very slowly at this part of the moon's surface, and that only a small portion of his disc is above the horizon there.* One notable effect of the absence of air, and the consequent brilliant lights and jet black shadows on our satellite, is, that telescopic power tells upon her surface to an extent incomparably greater than it does in the case of any other body

[* Besides, the sun's rays fall aslant on that part of the moon's surface.—R. P.]

in the sky. Let us assume that we are employing a power of 160. Well, this shows us the moon as she would appear to the naked eye, were she only 1468 miles from the surface of the earth—a pretty long distance truly; but when we consider that Mont Blanc is discernable, by unassisted vision, from Lyons, 100 miles off, through all the thickness of the intervening terrestrial atmospheric vapour, we shall gain some notion of what this represents in the case of the airless moon, with her brilliant lights and inky shadows. A power of 250 will bring her seemingly within 939 miles of us: but no useful purpose will be attained by the employment of such magnification (for Selenographical purposes) with a 3-in telescope. In our subsequent sketches 160 is the highest power that we shall use. The nature and character of the objects it will reveal will become apparent in the description of them which will follow.

Reviews.

POPULAR ASTRONOMY.*

By Richard A. Proctor.

I AM glad to see that this excellent treatise on astronomy has reached a second edition in England. Of its success in America it is unnecessary to speak. The present edition has in several important respects been brought up to date. Among those may be specially mentioned: (1) Dr. H. Draper's investigations on the existence of oxygen in the sun (but why are they not mentioned in the index?), of which Professor Newcomb has formed an opinion very different from that cold, half-dissenting view which rival workers in this country have expressed; (2) Janssen's conclusions from his solar photographs (again the index makes no mention of the added subject); (3) Professor Langley's investigations on the solar spectrum (omitted from index); (4) preliminary results from the late transit of Venus, and other recent methods of determining the sun's distance; and (5) recent developments in cometary astronomy.

I have already reviewed the first edition of this important work at considerable length in these pages, so that it is not necessary for me now to say that I regard it as a most valuable contribution to the literature of astronomy. Albeit one cannot but recognise that Professor Newcomb is more at home with mathematics than with composition, better as a computor than a theorizer, and a little disposed to overlook the difficulties which ordinary readers find when technicalities are employed.

It is a little remarkable that a professional astronomer, well versed in optical and physical laws, should err on the side of over-boldness in theorising. Yet Professor Newcomb seems to do so. Take, for instance, the following passage in reference to the Saturnian ring system:—"The question arises whether the comparative darkness of some portions of the bright ring may not be due to the paucity of the particles, which allow the dark background of the sky to be seen through." (We can tell what Professor Newcomb means, but it is not precisely what he says—viz., that, according to this view, we can see through the dark background of the sky!) "This question cannot be positively answered until further observations have been made; but the preponderance of evidence favours the view that the entire bright ring is opaque, and that the dark shading is due entirely to a darker colour of that part of the ring. Indeed, for anything we certainly know, the whole ring may be continuous and opaque, the darker shade of some parts arising solely from the particles being there black in colour." Now, in the first place, it is a demonstrated fact that the rings are not continuous. No one who has studied the researches of Clerk Maxwell and Benjamin Peirce can for a moment question this. And in the second, while the theory which accounts for the darkness of certain zones of the ring by sparsity of distribution of matter along these zones is natural and probable, the theory that certain sets of dark bodies have collected into these zones, while the light-coloured bodies have collected into others, is extravagant to a degree. When gravity begins to act as a colour-sifter, by influencing dark bodies and light bodies in different ways, we can accept such ideas; but not before.

Here, again, is a statement singularly inexact from a man with Professor Newcomb's knowledge of optics. Speaking of the atmosphere of Venus in transit, he says, "It would not be possible to see any indications of an atmosphere under such circumstances, for the reason that the light passing through its denser portions would be refracted entirely out of its course, so as not to reach an observer on the earth at all." It would be just as reasonable to say, "As regards the theory that we see the sun, after he has set geometrically, because of the refractive power of our air, it is, in fact, impossible to see him at all under such circumstances, for the reason that the light passing through the denser portions of our air is refracted entirely out of its course, so as not to reach the observer on earth at all." Precisely as we see the sun by means of rays which did *not* set out towards the observer, but were refracted towards him, those which set out towards him not reaching him at all, so, while rays from the sun towards Venus, and beyond her towards an observer on earth, fail to reach the observer, being deflected by the refractive power of her atmosphere, rays from other parts of the sun, which but for her air would not have reached the observer on earth, come to him and in fact give him those indications of an atmosphere which Professor Newcomb says it would be impossible to detect.

Other such mistakes remain uncorrected in the second English edition, and to some degree diminish the value of what otherwise would be (for the ground it covers) one of the most trustworthy astronomical works in existence. I note also the way in which the "stereo-plates" have been joined, evidence of anxiety to avoid expense in "resetting." But the treatise is one which every student of astronomy should read, and passages relating to subjects which Professor Newcomb has made specially his own are admirable.

The English editor, if such there is, or the reader for press, should have corrected in this edition the rendering of *Georgium Sidus* as "the Star of the Georges," which would correspond to *Georgiorum Sidus*—not that it matters much, as the silly name has long since followed other similar absurdities to the limbo of forgotten things.

* "Popular Astronomy." By Simon Newcomb, LL.D., of the Naval Observatory, Washington. Second London edition. (Messrs. Macmillan & Co., London.)

TO YOUNG MEN.*

Through false delicacy, many lads and youths are left to fall into trouble, and not a few have their prospects of healthy and happy life absolutely ruined. The knowledge kept from them by those whose duty it is to impart it wisely, and with proper explanation of its vital importance, they learn (too many of them) from foolish talk and to

* "A Physician's Sermon to Young Men." By Dr. William Pratt. (Ballière, Tindall, & Cox, London.)

the accompaniment of silly and unseemly jests. The experience essential to their safety, they acquire through the evil consequences from which it might have saved them—as it certainly saves all who, having sense, are worth saving.

The little book before us, of fewer than fifty pages, is intended to be put into the hands of young men by fathers who are unwilling to discharge a father's duty in this respect. And as not one father in ten is, we believe, ready to do what is right by his boys, himself, it is well that such a book as this should be available, especially as it gives some information which a physician is able to give with special authority. We commend it to the attention of fathers and sons alike; to the former, as showing what they should tell their boys; to the latter, as containing lessons which they should take to heart.

We are not sure but that the question of religion should *here* have been left untouched. It rather weakens the special plan of the pamphlet, by seeming to imply that, independently of religion, much that is here condemned might not be so objectionable and mischievous as it really is. If our author had contented himself by showing that every young man who values (1) his health, (2) his strength, (3) his temper, (4) his happiness, (5) length of life, (6) his fitness to take his place among his fellow-men, and finally, (7) his self-respect, should consider the precepts here enunciated, he would have given such sufficient reason, that religious motives, presented from another side, and acting with each according to the religious views of each, would have had double force. It is well that young men should know equally what is best for their own interests, and what is right for them apart from their own interests. But where each consideration is independently sufficient, the two should not be associated as if each required support from the other. Apart from which, those young men who are so unfortunate as to be without religion, and those whose religion is different from that here referred to, may be apt not to get all the good from Dr. Pratt's advice which they otherwise would.

However, a lad must be foolish indeed if he does not pay attention to the physical lessons conveyed in this most useful little work. If it is read by all who ought to read such a book, its sale will be counted by hundreds of thousands.

SALT.*

Taking as his text "Salt is good," Mr. Evan M. Boddy gives us a treatise on salt which is decidedly saline in flavour. His style is "crisp" to a fault. "Such imaginative plerophory" (imaginative plerophory is good) "is invariably antagonistic," he remarks, in dealing with one set of paradoxists, "to scientific conclusions and commonplace principles, besides being redundant of inane folly and trivial hyperbole." He speaks of the "unhealthful and insensate antipathy to salt which has infatuated, in a greater or a lesser degree, the several strata of society." Yet, so soon as he is fairly started on the history of salt, and is thus on his way to the discussion of salt "as a chemical, therapeutical, and toxicological agent," he moves along more smoothly—the gusts of wrath no longer blow him hither and thither, and he tells his readers many interesting facts. Albeit, it is not a demonstrated fact, as he states in Chapter III., that chlorine is nothing more nor less than the oxide of a metal, the researches of Professor Meyer, of Berne, having been by no means accepted as yet by his chemical brethren. In a later chapter, Mr. Boddy discusses the effects of salt on animal and vegetable life. Most land animals eat salt when they get the chance, and apparently with advantage. But many reptiles, and most of the lower types of animals, are deprived of life by the action of salt. Mr. Boddy—from carelessness, no doubt, not from ignorance—seems to convey the idea that life may be spontaneously generated, since he speaks of "insects generated by animal and vegetable decay," of "life produced by putrefaction," and so forth. The passages relating to the action of sea-water on seeds are interesting. The question is of importance as bearing on the transport of plants across sea. Darwin says that, out of 87 kinds of seed, 64 germinated after an immersion of 28 days, and a few survived after an immersion of 137 days. The medicinal and dietetic properties of salt are carefully considered; but here our author becomes wrathful again, as he does in considering the physiological properties of salt. The chapters on the geographical distribution and geological formation of salt are worth reading, and contain a quantity of curious evidence, obviously gathered with much care.

* "The History of Salt." By Evan M. Boddy, F.R.C.S., F.S.S., &c. (Baillière, Tindall, & Cox, London.)

THE FACE OF THE SKY.

From April 13 to April 27.

By F.R.A.S.

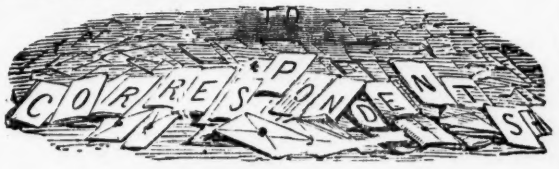
The sun should now be carefully watched, as indications of renewed violent action on his surface are apparent. As we write, several large spots (one of them enormous) are visible on his disc. The aspect of the night sky will be found portrayed in May IV. of "The Stars in their Seasons." Jupiter is now approaching the west so rapidly that he should be looked at as soon as may be after dark to be seen properly at all. He is situated to the N. and E. of ζ Tauri.

The visible phenomena of his satellites are fairly numerous. To-night (13th), I. will be occulted at 9h. 59m. On the 14th, the shadow of Sat. I. enters on Jupiter's disc at 8h. 20m. p.m.; Sat. II. disappears in occultation at 8h. 44m. p.m.; Sat. I. passes off Jupiter's face at 9h. 27m., followed by its shadow at 10h. 37m. On the 15th, Sat. I. will reappear from eclipse at 7h. 52m. 33s. On the 16th, the egress of the shadow of Sat. II. happens at 8h. 43m. p.m. The shadow of III. will pass off his face at 10h. 15m. p.m., on the 18th. On the 31st, the transit of Sat. I. begins at 9h. 10m. p.m., and that of its shadow at 10h. 15m. Jupiter will be too near the horizon at the times of their respective egress for that phenomenon to be fairly observable. On the 22nd, Sat. I. will be eclipsed at 9h. 48m. 8s. p.m. On the 23rd the shadow of II. will enter on the planet's face at 8h. 33m. p.m., the Satellite casting it passing off at 9h. 12m. Lastly, on the 25th, the egress of Sat. III. will occur at 9h. 36m. p.m. The directions previously given for finding Uranus above the 6th Mag. Star, 89 Leonis (to the N.W. of which he is now situated), are still applicable. Mercury, Venus, Mars, Saturn, and Neptune are all, for our present purpose, invisible.

Two occultations only of stars by the Moon occur during the ordinary working hours of the night within our specified period. To-night (April 13) the 3½ Mag. Star λ Geminorum will disappear at the Moon's dark limb at 8h. 20m. p.m., at an angle of 58° from her vertex, and reappear at her bright limb, at an angle of 342° from her vertex, at 9h. 6m. The second occultation is that of the 6th Magnitude Star 28 Libræ, which on the night of the 23rd will disappear at the Moon's bright limb 55 minutes after midnight, at an angle of 138° from her vertex. Its reappearance occurs at her dark limb, at an angle of 196° from her vertex, at 1h. 32m. o'clock the next morning. The Moon is 5·9 days old at noon on the 13th, 6·9 days at the same hour to-morrow, and so on. To-day her path lies through Gemini. She passes into Cancer on the 14th, remaining all day in that constellation. Travelling through Cancer on the 15th she enters Leo before noon on the 16th, during the whole of which day her path lies through it, and a portion of Sextans, as it does on the 17th and 18th also. She passes into Virgo before noon on the 19th, remains in that constellation during the 20th and 21st, travels into Libra on the 22nd, and does not quit it during the 23rd. On the 24th her path lies through the remaining part of Libra and

the southern part of Ophiuchus. Her path on the 25th is performed wholly through the latter constellation, which she does not quit until the 26th for Sagittarius, where she remains during the 27th.

Erratum.—In line 19 of Letter 777 (p. 210) $\frac{\sin PN \tan P}{\sin QM}$, should be $\frac{\sin PQ \tan P}{\sin QM}$; as must, however, be obvious from the immediately preceding proportion.



"Let Knowledge grow from more to more."—Alfred Tennyson.

Letters to the Editor.

Only a small proportion of Letters received can possibly be inserted. Correspondents must not be offended, therefore, should their letters not appear.

All Editorial communications should be addressed to the Editor of Knowledge; *all Business communications to the* Publishers, *at the Office, 74, Great Queen-street, W.C.* If this is not attended to, delays arise for which the Editor is not responsible.

All Remittances, Cheques, and Post Office Orders should be made payable to Messrs. Wyman & Sons.

The Editor is not responsible for the opinions of correspondents.

No communications are answered by post, even though stamped and directed envelope be enclosed.

MR. MATTIEU WILLIAMS ON "STAYS AND FAT."

[786]—May I be permitted to make a remark regarding Mr. Williams's interesting letter to you on the above topic? An intelligent lady friend remarked to me to-day:—"Mr. Williams says, in Knowledge, that fat is 'unburnt body fuel.' Is this correct? And if so, then is fat an abnormal feature of our bodies?" On referring to Mr. Williams's letter, I find he has apparently omitted one word, the insertion of which would remove, I think, misapprehension from the non-physiological mind. It is only *excessive* fat which is "unburnt body fuel." Everybody possesses a normal quantity of fat, and Mr. Williams, I daresay, knows the uses of this normal fat, as a "bedding," so to speak, for important organs (*e.g.*, the eye); as a non-conducting layer in the skin for the conservation of bodily heat; as a store of combustible matter, or normal fuel, capable of being reabsorbed into the blood, and, finally, as an occasional source of development of other (connective) tissues. Although in the succeeding sentence of his letter to that in which he speaks of fat as "unburnt body-fuel," Mr. Williams is careful to mention excessive accumulation of fat, yet his first statement in answer to the plain question, "What is fat?" is, I think, liable to mislead. I myself have been indebted on a former occasion to Mr. Williams for kindly criticising some of my attempts to instruct the public, through the medium of Knowledge, and I am glad to be able, in the present instance, to be of some little service to my accomplished colleague in return. Andrew Wilson.

NEW SKIRT—CHILDREN'S DRESS.

[787]—The lady correspondent in your issue of Friday last, in writing on the new skirt, has forestalled me in the account of her experience. I began a letter to you on this subject two months ago. I will now, however, only ask you to give my corroboration to all the healthful advantages and comforts in the lady's statement.

I feel that the desired reform in women's dress meets with a better reception through your Knowledge than it does from mere personal persuasion of friend to friend, and is considered more worthy of notice.

If grown women do not feel disposed to alter their own dear customs, surely every natural mother will be only too glad to bring up her daughters from infancy in our approved and hygienic costume.

I have a little girl just thirteen. She was, according to fashion, clothed in three petticoats and a frock, until two years since, when she went into—not "short frocks," nor "long dresses," but a "combination garment," which takes the place of the three petticoats, and answers the description of a lady's skirt, except that instead of the calico band it is suspended from the shoulders, covering the humerus. The temperature of the body is, I think by this means more easily rendered equable. It amounts almost to a punishment to ask this child now to wear a petticoat, even for extra warmth.

With ignorance and prejudice at bay, may we not hope for better things in the mothers of the future?

A Member of the L.S.A.

SINGLE EYE-GLASSES.

[788]—I observe that in Knowledge of March 30, the author of "How to Use the Eyes" deprecates the use of single eye-glasses. He does not mention, however, what should be done in cases where one eye is weaker than the other.

I heard once of an optician who made spectacles in which the lenses were of different power, which led to a good deal of discussion among medical men as to whether such spectacles were beneficial or not, in the case referred to above.

As this may be a point of interest to many of the readers of your journal, I hope the author of these articles on the use of the eyes will refer to it in one of the next papers.

A. Kling.

LETTERS RECEIVED.

E. D. G. That I do *not* think your views absurd is best shown by the fact that in the first edition of my "Other Worlds" I advanced just such views. But so many get so angry and unreasonable when the subject is discussed, that I must beg you not to be angry with me if I do not find room for your letter.—E. M.—F. C. S.—W. F. Bridges.—S. J.—E. G. Allen.—William Wilson, LL.D.—Zetesis. The theory of a flat earth is too absurd for further discussion here. Your "reasons" are absolutely invalid.—J. Murray.—Constant Reader of Knowledge.—A. N. Somerscale. J. Grundy.—C. Nicholls.—J. McGrigor Allan.—H. D. C.—Major.—R. I. R.—A. O. Hume.—A. S. Johnson.—Herbert Rix.—F. G. S.—R. G. Ouseley.—H. Skey Muir, M.D.—H. Stock.—W. M. N.—Bad Memory.—W. Baird.—C. J. Curtis.—Novice.—T. Knox Fortescue. Mr. H. Phillips.—A. Polson.—J. Munro.—An Admirer of a Slender Waist.—A. Blakes.—T. F.—C. Ashley.—J. McE. Unable to speak from any knowledge of my own.—A. Kling.—H. E. Bullock.—P. Carmichael.—A. T. Brett.—W. Walton.—F. G. Heath—T. Common.—J. Crowther.—W. E. Phillpotts.—W. G. Mortimer.

Our Whist Column.

By "Five of Clubs."

PLAYING TRUMPS—(*continued from p.* 185).

THE signal for trumps is now so constantly in use that we must set aside all discussion as to whether Whist has been improved or impaired by its invention. All that has to be considered is when and how to signal.

Signalling from five trumps, no honour, and an otherwise weak hand, or from five trumps, one honour, or four trumps, two honours, the rest of the hand being weak, must be regarded as unsound play. From such hands you may properly lead trumps, but not signal.

Many players hold that you may signal when, having the lead, you would not lead trumps—as by winning third hand with King when you hold Queen, or with Ace when you hold King. On the same principle, one might lead Ace before King from Ace, King, and others, to indicate the wish for a trump lead from partner. But it is a good rule to follow—more nearly a constant rule than almost any that can be named—to regard no hand from which one would not lead trumps, no matter what the trump card, as one with which it is right to signal. A trick may occasionally be made by waiting, in such cases, for a lead from partner, but in the long run more is lost.

In signalling second in hand, one must be especially careful to play an unnecessarily high card, and not a card which may be mistaken for an attempt to take the trick; at least this may be done where it is possible. Playing ten or Knave second hand, and in the second round a small one, is not a signal, unless the Knave or Queen (respectively) should fall, so as to show you were not playing the customary lowest from Queen, Knave, or Knave, ten, and a small one. To signal effectively from Queen, Knave, and a small one, the Queen must be played, and then the Knave, not the Knave

and then the small one. Similarly from Knave, ten, and a small one.

One may signal, of course, as readily by a discard as when following suit.

In passing I may note that it may be either unwise or unfair to *hesitate* when the chance of signalling comes. Repeatedly it happens that second player shows—to his loss, or it may be to his gain, according to circumstances—that he is strong in trumps, but not quite strong enough to signal, by hesitating before playing a small card such as, but for doubts as to signalling, he would have been sure to play without hesitation. Thus I lead Ace; the player on my left after hesitating and perhaps drawing out another card, plays Deuce: I know, and every one else at the table knows, that he had thought of signalling, but concluded to refrain. He is therefore certainly strong in trumps, but not quite strong enough to signal. It is unfair to show this to a partner who may be, perhaps, himself so strong in trumps as to be sure it is safe to lead them after what he has learned; on the other hand, it is not wise to show this strength to the enemy, who may have good strength, too, and take advantage of what they have learned to force you, or otherwise spoil your plans. The risk may compensate the advantage; but in any case it is not Whist to show anything about your hand by a trick, either of design or of carelessness.

In my next I shall consider the Echo of the Signal.

(To be continued.)

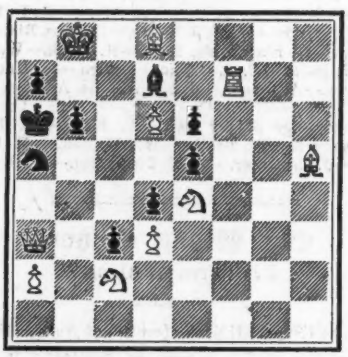
Our Chess Column.

By Mephisto.

We regret that this problem was misprinted in our last week's number; we now give a corrected diagram.

REPRINT PROBLEM No. 84.

Black.



White.

White to play and mate in three moves.

(A test of skill in solving.)

GAME PLAYED IN A CORRESPONDENCE TOURNEY.

Scotch Gambit.

White. G. W. Stevens.	Black. W. T. Pierce.	White. G. W. Stevens.	Black. W. T. Pierce.
1. P to K4	P to K4	14. Kt to B3	P to Q4 (*e*)
2. Kt to KB3	Kt to QB3	15. Kt to K5	B to Kt4 (*f*)
3. P to Q4	P takes P	16. B takes B (*g*)	P takes B
4. Kt takes P	B to B4	17. Q to K2 (*h*)	Q to QR3
5. B to K3	Q to B3	18. Q to R5 (*i*)	P to KKt3
6. P to QB3	KKt to K2	19. P takes KtP	BP takes P
7. Q to Q2 (*a*)	P to QR3	20. Q to Kt4	Castles KR
8. P to KB4	P to Q3	21. P to KR4 (*j*)	Q takes P
9. Q to KB2	Kt to Kt3	22. P to R5	Q to Kt6
10. Kt to Q2	B to Q2	23. K to Kt sq	Kt to B4 (*k*)
11. Castles	Kt tks Kt (*b*)	24. P takes Kt (*l*)	R to R8 (ch)
12. P takes Kt	B to QKt5 (*c*)	25. K takes R	Q to B7
13. P to B5 (*d*)	Kt to K2	Resigns	

NOTES.

(*a*) Blackburne's attack.
(*b*) The exchange is in White's favour.
(*c*) B to R2 is to be preferred.
(*d*) B to B4 would have been stronger play.
(*e*) Well calculated to break his centre.
(*f*) Black prefers to keep his King in safety, especially as White cannot do much.
(*g*) Dangerous, as it opens the Rook's file.
(*h*) He ought to have played K to Kt sq.
(*i*) White cannot defend the Rook's Pawn, for if 18. P to QR3, Black would take the Pawn with the Bishop, and speedily obtain a winning advantage.
(*j*) A forlorn hope.
(*k*) The combination that follows depends on this move, as it prevents the Queen checking on K6; but Black had a simpler way of effecting the mate by R to R7, followed by Q to R5.
(*l*) If 24. P takes KtP, then P to R3. 25. P to Kt7, R to B3, threatening KR to R3, which is fatal.

Dear Mephisto,—In your remarks contesting the truth of Poe's proposition that, "The best chess-player in Christendom *may* be little more than the best player of chess," you don't put the word may in italics—an important point, as many persons have misunderstood Poe to mean that good chess-players are good players of chess and *probably* nothing else, and not, as I take it he clearly desires to convey, *possibly* nothing else.

You meet Poe's assertion, that excellence in chess must not alone be taken as a proof of general ability, by saying that, "Good chess-players are to be found mostly among the higher professions requiring great mental abilities, such as men of great learning and letters, accountants, and clergymen." I cannot consider your illustration good. It is news to hear that the profession of accountant requires great mental abilities; and what does Buckle (eminent both as historian and chess-player) say of clergymen:—"If, however, the inferiority of the boy is obvious, a suitable remedy is at hand: he is made either a soldier or a clergyman—he is sent into the army or hidden in the Church."

It appears to me that all you have tried to prove is that many men of known ability have been and are good chess-players. I believe Poe would have been the first to agree to this. G. L.

[Our correspondent has clearly misunderstood us. We did not argue the question (we think mere argumentative philosophical theories belong to a past era), but we proved it. It therefore matters little whether Poe meant that good chess-players are *possibly* or *probably* nothing else than good chess-players. We positively assert that men (amateurs) who have attained excellence in chess are men of culture, refinement, or otherwise distinguished in their professions. This we could easily prove by naming the twelve best amateur chess-players in England. Such a course, however, is not feasible in these columns.

As to saying that accountants do not require mental abilities, or Buckle's witticism about the clergy, we hardly think they require special contradiction. That a person whose business it is to master stupendous and complex accounts possesses mental ability, goes without saying. The time is also past when a dull boy can either get on in the army or the Church. We have frequently met clergymen who were strong chess-players, we invariably found them to be men of mental abilities, culture, and refinement, and, if we may judge by outward appearances, fairly successful in life. "If there are clergymen of a different character, they cannot be strong chess-players."—Mephisto.]

[Does not Poe mean that *a* first-class chess-player may be little but a first-class player of chess? This would be rather different from saying that good chess-players may be worth little outside chess. A first-rate mathematician may be worth nothing outside his formulæ; yet many mathematicians are men of excellent general abilities.—R. P.]

On Saturday, the 14th inst., Mr. Zukertort will play eight games blindfold against the strongest members of the North London Club, at the Morley Hall, Hackney.

A third edition of "100 Chess Problems," by the Rev. A. Cyril Pearson, is in course of preparation by the Civil Service Publishing Co., 8, Salisbury-court, Fleet-street, which will include a few problems lately composed, and a "four-mover" which took the double first prize in the Chess Monthly Problem Tournament. 2s. 9d. post-free.

ANSWERS TO CORRESPONDENTS.

*** *Please address Chess Editor.*

J. C. S.—Problems received with thanks.

M. T. Hooton.—In Problem 81, if B takes Kt, B takes B (ch.) Correct solutions received.—Problem No. 81, J. Evelyn. No. 82. W., Clarence. No. 83, W.

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